ASTRONOMY AND ASTROPHYSICS

A European Journal

Volume 2 1969

Published by Springer-Verlag Berlin · Heidelberg · New York
on behalf of the Board of Directors

Astronomy and Astrophysics

A European Journal

Board of Directors

Chairman: A. Blaauw (ESO) Vice Chairman: B. Strömgren (Denmark)
Secretary and Treasurer: Y. Mazières (France)

L. Biermann (Germany)
H. G. van Bueren (The Netherlands)
J. Delhaye (France)
Ch. Fehrenbach (France)
W. Fricke (Germany)
G. W. Funke (Sweden)
J. H. Oort (The Netherlands)
E. Schatzman (France)
A. Unsöld (Germany)
A. G. Velghe (Belgium)

Editors-in-Chief 1969-72

S. R. Pottasch
Kapteyn Astronomical Laboratory
Broerstraat 7,
Groningen (The Netherlands)

J. L. Steinberg
Observatoire de Meudon
92 Meudon (France)

Editing Secretaries

Mrs. M. Steinberg
Miss O. Hänni

Miss G. I. van der Wal

Board of Editors

W. Becker (Basel)
A. Behr (Hamburg)
E. J. Blum (Meudon)
E. M. Burbidge (La Jolla)
G. M. Clemence (New Haven)
Ph. Delache (Nice)
P. Felenbok (Meudon)
G. B. Field (Berkeley)
S. C. B. Gascoigne (Canberra)
M. Hénon (Nice)
G. H. Herbig (Lick Obs.)
G. Herzberg (Ottawa)
L. Houziaux (Mons)
H. C. van de Hulst (Leiden)
C. de Jager (Utrecht)
F. D. Kahn (Manchester)
R. Kippenhahn (Göttingen)
H. van der Laan (Leiden)
P. Ledoux (Liège)
J. Lequeux (Meudon)
P. O. Lindblad (Stockholm)
R. Lüst (München)
R. Michard (Meudon)
M. G. J. Minnaert (Utrecht)
B. Morando (Paris)
J. C. Pecker (Meudon)
S. I. Rasool (New York)
J. Rösch (Obs. Pic du Midi)
M. Ryle (Cambridge)
D. H. Sadler (Herstmonceux)
M. Schmidt (Pasadena)
F. G. Smith (Jodrell Bank)
P. Swings (Liège)
A. B. Underhill (Utrecht)
H. Van Regemorter (Meudon)
J. P. Wild (Sydney)
L. Woltjer (New York)

The exclusive copyright © for all languages and countries, including the right for photomechanical and other reproduction, is vested in European Southern Observatory (ESO)

The quotation of registered names, trademarks, etc. in this journal does *not* imply, even in the absence of a specific statement, that such names are exempt from laws and regulations protecting trademarks, etc. and therefore free for general use.

Springer Verlag · Berlin · Heidelberg · New York

Printed in Germany

Druck: Brühlsche Universitätsdruckerei, Gießen

Volume 2 1969

Contents

Stars and Stellar Evolution

A. M. VAN GENDEREN: Five-Colour Photometry of the X-Ray Source Sco X-1 6

R. VAN DER BORGHT: The Effect of a Magnetic Field on the Convective Instability of a Compressible Polytropic Atmosphere 96

A. TERZAN: Nova Vulpeculae 1968 n° 2 100

E. MEYER-HOFMEISTER: A Theoretical Hertzsprung-Russel-Diagram for the Star Cluster NGC 1866 143

R. FARAGGIANA: A Study of 48 Librae in the Period 1950–1962 162

W. D. HEINTZ: Orbits of Eight Visual Binaries 169

KAREN M. STROM: Detailed Analyses of the Peculiar A Stars. I. The Manganese Stars 182

M. SCHNEIDER: BCD Classification for 19 Cepheids. I. A Determination of Interstellar Reddening 195

J. PROVOST and C. VAN'T VEER-MENNERET: A Comparative Detailed Analysis of 22 Serpentis, a High Metallicity A2 Star, and the Standard F0 V: 9 Aurigae 218

B. BASCHEK and D. REIMERS: On the Microturbulence in A and F Stars 240

SURINDAR SINGH and J. N. TANDON: The Hydromagnetic Oscillations and Stability of Self-Gravitating Masses. II 266

W. R. BURNS and B. G. CLARK: Pulsar Search Techniques 280

R. KIPPENHAHN: Secularly Unstable Differential Rotation in Stars 309

I. YAVUZ: The Spectroscopic Orbital Elements of Eclipsing Binary IZ Per=BV 224 388

R. SIMON: Rotational Perturbation of a Radial Oscillation Gaseous Star 390

Galactic Structure, Stellar Dynamics, Interstellar Matter

A. KIRAL: The Stellar Group Ba 6 22

A. KIRAL: The Galactic Cluster NGC 2254 25

M. HÉNON: Rates of Escape from Isolated Clusters with an Arbitrary Mass Distribution 151

R. M. HJELLMING, C. P. GORDON and K. J. GORDON: Properties of Interstellar Clouds and the Inter-Cloud Medium 202

B. E. TURNER: Search for Microwave Emission from the $^2\pi_{1/2}$, $J = 3/2$ State of OH 453

Galaxies, Cosmology

R. CRILLON and G. MONNET: Kinematic Study of Ionized Hydrogen in NGC 4631 1

C. FANTI, R. FANTI, P. LONDRILLO and L. PADRIELLI: The Radiospectra of a Homogeneous Sample of 4C Radiosources 477

The Sun

N. GREVESSE and J. P. SWINGS: Forbidden Lines of Fe II in the Solar Photospheric Spectrum 28

S. DUMONT: On the Interpretation of the Center-Limb Observations of Ca II Emission Cores 45

J. C. PECKER and S. R. POTTASCH: On the Abundance Determination in the Solar Chromosphere 81

J. P. ROZELOT: Photography of the U.V. Lines in the Solar Corona 122

G. CHAMBE and M. SAIN: The Observation of Solar Soft X-Ray Bursts and their Relations with Microwave Radio Bursts 133

J. C. HÉNOUX: A Model of Sunspot Umbra 288

E. RIBES: Study of the Correlation between Flares and the Evolution of Magnetic Field 316

R. Boyer: Observation of Profiles and Asymmetry of Fraunhofer Lines 375

Y. Biraud, J. Gay, J. P. Verdet and Y. Zéau: Atmospheric Transmission and Solar Spectroscopy in the Submillimeter Wavelength Range 413

T. Garz, H. Holweger, M. Kock and J. Richter: Revised Solar Iron Abundance and its Influence on the Photospheric Model 446

G. Worrall and A. M. Wilson: Inversion of the Intensity Integral for the Doppler Core of Strong Solar Absorption Lines 458

A. M. Wilson and G. Worrall: An Analysis of the Solar Sodium D Lines 469

Physical Processes

M. R. Raghavachar: Thermal Instability in the Presence of Hall-Current 18

T. Garz and M. Kock: Experimental Oscillator Strengths for Fe I Lines 274

S. Sahal-Bréchot: Impact Theory of the Broadening and Shift of Spectral Lines due to Electrons and Ions in a Plasma (Continued) 322

G. C. Pomraning: The Effects of Polarization on Diffusion Descriptions of Radiative Transfer 419

O. H. Crawford, A. C. Allison and A. Dalgarno: Electron Impact Excitation of CN 451

Planetary System

A. Dollfus and J. Focas: The Planet Mars: the Nature of its Surface, the Characteristics of its Atmosphere from the Polarimetry of its Light 63

A. Dollfus, J. Focas and E. Bowell: The Planet Mars: the Nature of its Surface, the Characteristics of its Atmosphere from the Polarimetry of its Light, Part II. The Nature of the Soil 105

J. Schubart: The Minor Planet (1221) Amor 173

G. Bourgois: Interplanetary Scintillations of Radiosources at 2695 MHz 209

J. H. Focas and A. Dollfus: Optical Characteristics and Thickness of Saturn's Rings Observed on the Ring Plane in 1966 251

J. Kovalevsky and F. Link: Diametre, Flattening and Optical Properties of the Upper Atmosphere of Neptune as Derived from the Occultation of BD −17° 4388 398

Celestial Mechanics and Astrometry

J. Roels: Periodical Orbits around Equilateral Points for a Resonance of 1/4 52

R. Forga: Artificial Lunar Satellite 75

P. Couteau: Fundamental Separations of Close Visual Binaries 126

M. O. Mennessier and M. Crézé: On Statistical Estimates from Proper Motions and Radial Velocities 355

A. Bec: Determination of the Mass of Jupiter Using the Motion of its Ninth Satellite 381

J. Chapront and L. Mangeney: Literal Developments in the Analytical Theory of the Moon 425

Research Notes

D. T. Wickramasinghe and P. A. Strittmatter: A Note on the Temperature Correction Procedure for Line-Blanketed Atmospheres 242

Claudio Grubissich: Remarks on the Distance of the Association I Puppis and the Cluster NGC 2467 245

E. Gerard: Observations of Saturn, Uranus and Neptune at 11.13 cm 246

I. Bues, T. Haag and J. Richter: Spectroscopic Investigation of an Argon Arc Plasma 249

G. M. Gruber: Unresolved Background Radiation at 2695 MHz 369

V. C. Rubin and S. D'Odorico: A Note on the Systemic Velocity of M 31 484

Letter to the Editor

G. A. Seielstad: Circular Polarization Measurements of Compact Radio Sources at 1420 MHz 372

Erratum

M. Arnould and C. Brihaye: Possibility of Synthesis of Proton Rich Nuclei in Highly Evolved Stars 250